Paint-It: A Children’s Habit Revised

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Abstract. Ambient Intelligence technologies can play an important role in enriching the education and learning experience. Such technologies offer students increased access to information within an augmented teaching environment which encourages active learning and collaboration, enhancing their motivation to learn. This paper focuses on transferring painting into the Ami environment through the usage of an augmented digital surface as a painting canvas, and offering interaction through augmented physical painting material such as paint tubes, brushes, physical palettes of color, etc. This enriched painting experience is targeted to support the development of artistic skills for young artists through employing artistic concepts such as color theory, color mixing for artists, brush type information, etc.

Keywords: Ambient Intelligence, Serious Games, Learning, Painting, User Interfaces for children.

1 Introduction

Undoubtedly painting is considered one of the most joyful activities for children, and it has important impact on child development as well. Research conducted in the field has depicted that cutting, pasting and painting are the most frequently occurring preschool activities [21]. The benefits of painting activities for children are well known in the pedagogical domain and will not be discussed here. This paper aims at transferring the children’s painting experience in modern digital environments while maintaining all the benefits and fun of physical painting, by exploiting ambient intelligence techniques. This is achieved through the development of a serious game named Paint-it, which combines an augmented digital surface for painting with physical objects such as brushes, paint tubes, and painting palettes, which maintain in the digital world their meaning and functionality of the physical world.

2 Background and Related Work

Innovative learning environments such as Serious Games (SGs) and simulations provide an applied context in which novel skills can be learned, applied, mastered,
integrated and transformed into new concepts and application areas. The fact that people learn from digital games is no longer in dispute. Research [6,7,8,9,10,11] has shown that serious games can be a very effective as instructional tools and can assist learning by providing an alternative way of interacting and presenting instructions and content, with enhanced efficacy over traditional learning. A learner’s motivation impacts the learning outcome more than any other factor [5], and SGs seem to be very effective to this purpose [25]. As a consequence, such environments are becoming increasingly popular as vehicles of knowledge transfer and learning. Additionally, SGs have become both a growing market in the video games industry [1,2] and a subject of academic research [3], receiving attention from many diverse fields such as computer science, business studies, psychology, cultural studies, sociology and pedagogy [4].

One of the main characteristics of a serious game is the fact that the instructional content is presented together with fun elements. Such a game makes learners become personally involved with playing in an emotional and cognitive way. By engaging learners emotionally and cognitively, attention and motivation are increased, thus supporting learning.

The usage of ICT technology to offer entertainment painting experiences to children has been considered in the past in a number of different variations. A collaborative, computer-based finger painting program for children has been proposed in the past facilitating an input surface called MultiTouch Surface (an input device that is separated from the computer screen used to transfer signals on a pc and then display the results on the screen) [24]. The evolution of ICT technology and its penetration to everyday activities has today made this form of painting available through mainstream devices such as smart-phones and tablets.

This paper propose a novel form of digital painting where traditional painting materials reappear and play a crucial role in the way that children understand and interact with the application.

3 Building a Collection of Augmented Physical Objects for Painting

The Paint-it system builds on the Tag recognition facilities offered by the Microsoft Surface SDK and the Samsung SUR-40 Microsoft Surface device to create a number of augmented physical objects to be exploited by children while painting (see Fig. 1). These objects either emulate the feeling of painting using actual art supplies or act as easy to understand and use control elements (physical game controls).

Brushes are an important tool for painting. There are different shapes and sizes of brushes. A number of different brushes are available in the Paint-it application (see Fig. 1 section A), exhibiting different behaviours depending on the blob tracking capabilities of the device. More specifically, the blob that the brush creates when placed on top of the painting surface is used to produce the brush size used. This allows starting a stroke with a large stroke weight but adjust it accordingly while moving on the surface by simply reducing the pressure applied on the brush. In this sense any size, filament and shape of brush can be used. Currently, a set of children’s painting brushes are used in Paint-it.